CSIS492

Senior Seminar

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Raspberry Pi Smart Security Camera

There have been several instances of people getting their packages stolen from their doorsteps, property vandalized, break-ins, and many others. This sparks a sense of insecurity and fear in the minds of people. A way to get the ease of mind would be installing a security camera. One can get a security camera from the market or build one by himself for cheap. This can be done using raspberry pi and an open-source computer vision library called OpenCV.

Introduced in 2012, the Raspberry Pi is a credit-card sized computer. Raspberry pi can be thought of as a computer that can fit into a pocket. It is a capable little device that enables people of all ages to explore computing and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. It can be loaded with several types of OS like Raspbian and Ubuntu. There are several components available for the raspberry pi that can be used for measuring temperature, pressure, distance, and so on. Tinkers, programmers, and DIYers across the globe have adopted the tiny platform for projects ranging from recreating retro arcade cabinets to controlling robots to setting up cheap but powerful home media devices.

OpenCV (Open Source Computer Vision Library) is an open-source computer vision and machine learning software library. The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high-resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. It has C++, Python, Java, and MATLAB interfaces and supports Windows, Linux, Android, and Mac OS.

This project involved using a raspberry pi 3 b model and a raspberry pi camera module v2. This project utilizes the face recognition model from the OpenCV library to detect the presence of a person and notifies the owner of the suspenseful activity. It sends an email to the user along with the picture of the person detected. It then starts recording the video until it detects any motion. It then stores the video to the drive. One can live the stream the video from the surveillance camera from anywhere using their electronic devices such as laptops and smartphones. Here is a short demonstration of how the raspberry pi security camera works: https://minnstate.zoom.us/rec/share/xcUoF5LUqiBJRIXh-lyPV5YfIoXgX6a8gSRLrKAFxUmEEEkaXpc9B6_iOpBlb4uj?startTime=1587151862000

and here is the source code to the project: https://github.com/TejendraKhatri/security_cam.git